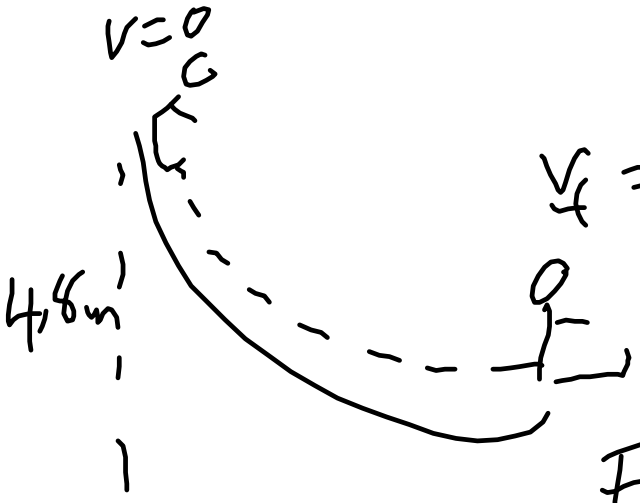
p239

q26 m=28kg h=4.8m v_f = 3.2m/s



$v_f = 3.2 m/s$ $E_{lost} = ?$

$E_{total\,i} = E_{total\,f}$

$E_g = E_K + E_{lost}$ $E = W_f$

$mgh = \frac{1}{2}mv^2 + E_{lost}$ $F_f d$

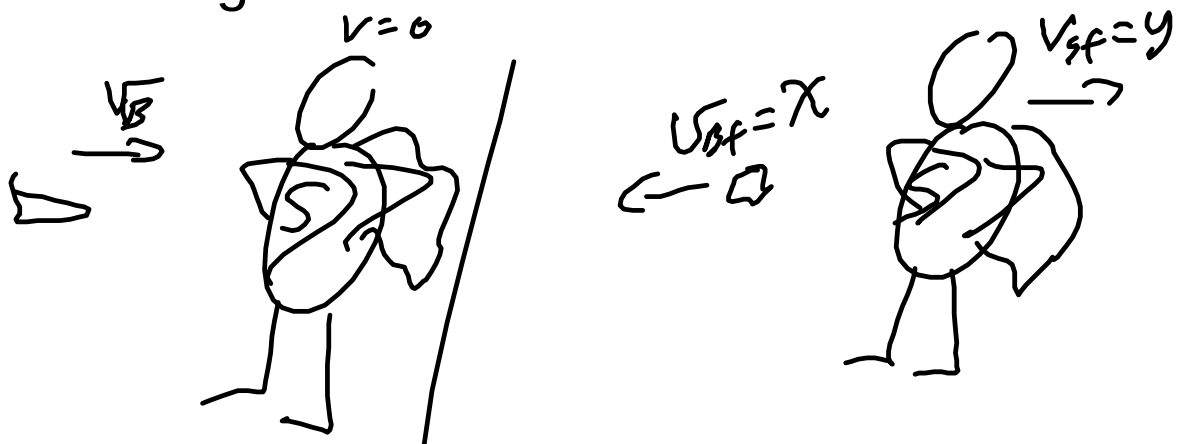
$E_{lost} = 28(9.8)(4.8) - \frac{1}{2}(28)(3.2)^2$

p235
Q14 bullet hits block of wood embeds - inelastic collision - stick together

Q15
Perfectly elastic collision- bounce off each other - total kinetic energy of the objects is conserved through the collision

v=0

conserved through the collision



Collisions: $\sum P_i = \sum P_f$ $\quad p = mv$

$$m_B v_B = m_B x + m_S y$$

Perfectly elastic $\quad \frac{1}{2} m_B v_B^2 = \frac{1}{2} m_B x^2 + \frac{1}{2} m_S y^2$

$\times m_B$

$$x = v_B - \frac{m_S}{m_B} y$$

$$v_B^2 = \left(v_B - \frac{m_S}{m_B} y\right)^2 + \frac{m_S}{m_B} y^2$$

$$(835)^2 = \left(835 - \frac{104}{0.0042} y\right)^2 + \frac{104}{0.0042} y^2$$

$\frac{104}{0.0042}$

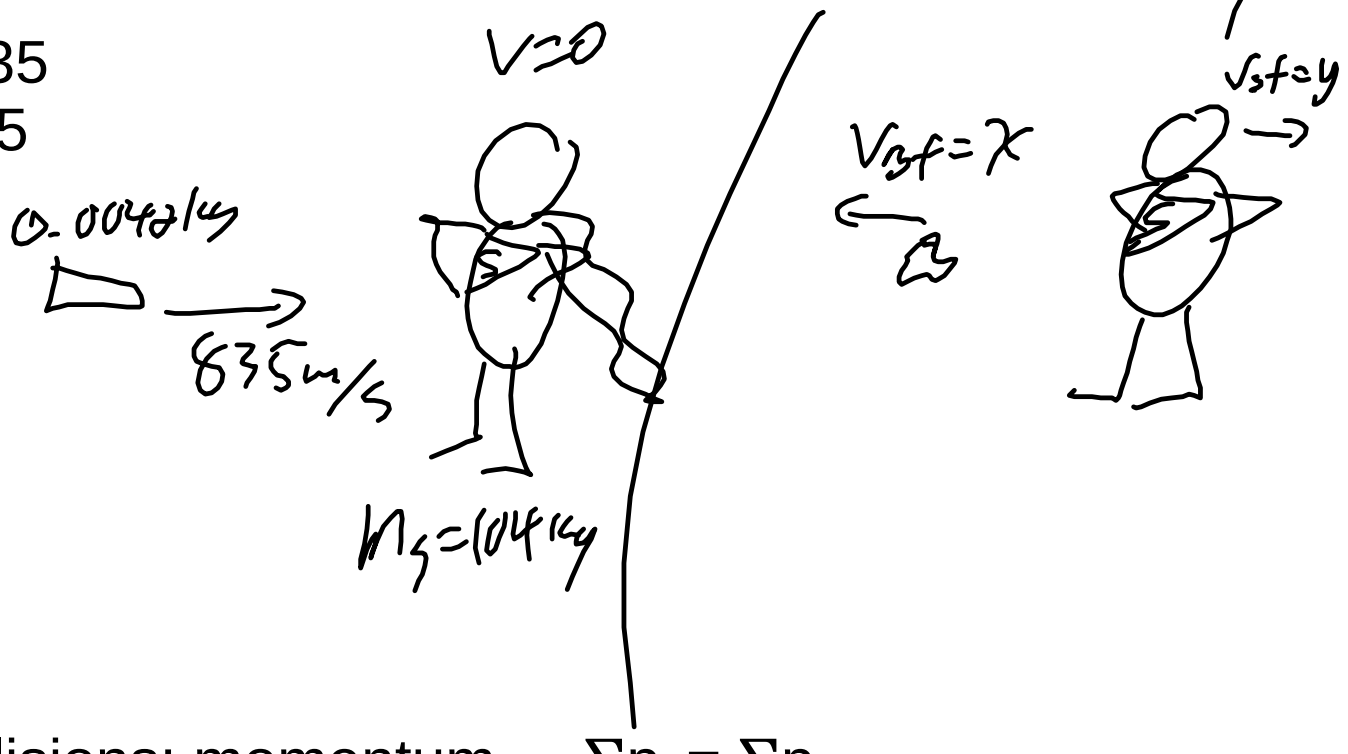
$$0 = -2(835) + \frac{(104)}{0.0042} y + y$$

$$11 - \frac{2(835)}{}$$

$$0 = -2(835) + \frac{(104)}{0.0042}y + y$$

$$y = \frac{2(835)}{1 + \frac{104}{0.0042}} = 0.068 \text{ m/s}$$

p235
Q15



collisions: momentum - $\sum p_i = \sum p_f$

$m_b v_b = m_b x + m_s y$

problem, 2 unknowns, x and y

elastic collision: special case where kinetic energy is conserved.

$\sum E_{ki} = \sum E_{kf}$

$1/2\ m_b v_b^2 = 1/2\ m_b x^2 + 1/2\ m_s y^2$

now we do the math skills

now we do the math skillz

$m_b v_b = m_b x + m_s y$

$x = v_b - (m_s/m_b)y$

$1/2\ m_b v_b^2 = 1/2\ m_b\ (v_b - (m_s/m_b)y)^2 + 1/2\ m_s y^2$

simplify

$v_b^2 = (v_b - (m_s/m_b)y)^2 + (m_s/m_b)\ y^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$v_b^2 = v_b^2 - 2(m_s/m_b)v_b y + (m_s/m_b)^2 y^2 + (m_s/m_b)\ y^2$

$0 = -2(m_s/m_b)v_b y + (m_s/m_b)^2 y^2 + (m_s/m_b)\ y^2$

$0 = -2v_b + (m_s/m_b)y + y$

$2v_b = [(m_s/m_b) + 1]\ y$

$2(835) = [(104/0.0042)+1]y$

$y = 2x835/((104/0.0042)+1) = 0.0674$ m/s

Q31 same question with different numbers